

What is claimed is:

- 1 1. A system comprising:
2 a first expander having plural interfaces to couple to at least one of a peripheral
3 device, a controller, and another expander, the first expander having a storage to store entries
4 containing routing information used to route a request received by the first expander to one of
5 the interfaces, wherein each interface is allocated a respective set of the routing information
6 entries; and
7 mapping logic operable to remap unused routing information entries allocated to one
8 of the interfaces to one or more other interfaces to expand capacity of the one or more other
9 interfaces.
- 1 2. The system of claim 1, further comprising a port in the first expander, the port having
2 at least two of the plural interfaces allocated respective sets of the routing information entries,
3 the mapping logic operable to further map the routing information entries allocated to
4 the at least two interfaces of the port such that each of the at least two interfaces of the port
5 share the same routing information entries.
- 1 3. The system of claim 2, wherein the routing information entries of the at least two
2 interfaces are redundant prior to mapping the routing information entries.
- 1 4. The system of claim 3, wherein the mapping logic is part of a dynamic route table
2 mapping mechanism.
- 1 5. The system of claim 2, wherein the interfaces comprise serial attached small computer
2 system interface (SAS) phys.

- 1 6. The system of claim 5, wherein the SAS phys comprise at least one SAS phy
2 connected according to a direct routing method, at least one SAS phy connected according to
3 a subtractive routing method, and at least one SAS phy connected according to a table routing
4 method,
5 wherein routing information entries of the SAS phys connected according to the direct
6 routing and subtractive routing methods are unused,
7 the mapping logic operable to remap the unused routing information entries of the
8 SAS phys connected according to the direct routing method and subtractive routing method to
9 the at least one SAS phy connected according to the table routing method.
- 1 7. The system of claim 6, wherein the routing information entries comprise route table
2 entries.
- 1 8. The system of claim 1, further comprising non-volatile memory to store configuration
2 information, the mapping logic operable to remap the routing information entries based on the
3 configuration information.
- 1 9. The system of claim 8, further comprising discovery software executable to send
2 commands to populate the routing information entries,
3 wherein remapping is performed without discovery software control.
- 1 10. The system of claim 9, the mapping logic operable to map the commands from the
2 discovery software to locations in storage containing the routing information entries.
- 1 11. The system of claim 1, further comprising one or more peripheral devices connected
2 to the first expander.
- 1 12. The system of claim 11, wherein the one or more peripheral devices comprise one or
2 more storage devices.

1 13. The system of claim 1, wherein remapping the routing information entries to the one
2 or more other interfaces enables the one or more other interfaces to be coupled to more
3 devices than without the remapping of the routing information entries to the one or more
4 other interfaces.

1 14. The system of claim 1, wherein the first expander is adapted to couple to a first
2 number of devices before the remapping, and the first expander is adapted to couple to a
3 second number of devices after the remapping,
4 the second number being greater than the first number.

1 15. The system of claim 1, wherein the mapping logic is part of the first expander.

1 16. The system of claim 1, further comprising:
2 a storage subsystem containing the expander;
3 a processor; and
4 software executable on the processor to issue commands to the storage subsystem to
5 access data stored in the storage subsystem.

1 17. An expander for use in a system having a peripheral device, a controller, and another
2 expander, comprising:
3 plural interfaces to couple to at least one of the peripheral device, the controller, and
4 the another expander;
5 a storage to store entries containing routing information used to route a request
6 received by the expander to one of the interfaces, the interfaces being allocated respective sets
7 of the routing information entries; and
8 mapping logic operable to remap unused routing information entries allocated to a
9 first one of the interfaces to a second one of the interfaces.

1 18. The expander of claim 17, further comprising a port having at least two of the plural
2 interfaces,
3 the mapping logic operable to further map the routing information entries such that
4 each of the two interfaces of the port share the same routing information entries.

1 19. The expander of claim 18, wherein the routing information entries of the at least two
2 interfaces are redundant prior to mapping the routing information entries.

1 20. The expander of claim 17, wherein the interfaces comprise serial attached small
2 computer system interface (SAS) phys.

1 21. The expander of claim 20, wherein the SAS phys comprise at least one SAS phy
2 connected according to a direct routing method, at least one SAS phy connected according to
3 a subtractive routing method, and at least one SAS phy connected according to a table routing
4 method,

5 wherein routing information entries of the SAS phys connected according to the direct
6 routing and subtractive routing methods are unused,

7 the mapping logic operable to remap the unused routing information entries of the
8 SAS phys connected according to the direct routing method and subtractive routing method to
9 the at least one SAS phy connected according to the table routing method.

1 22. The expander of claim 17, further comprising non-volatile memory to store
2 configuration information, the mapping logic operable to remap the routing information
3 entries based on the configuration information.

1 23. The expander of claim 17, wherein the expander is adapted to couple to a first number
2 of devices before the remapping, and the expander is adapted to couple to a second number of
3 devices after the remapping,

4 the second number being greater than the first number.

- 1 24. A method for use in a system having a first expander containing plural interfaces to
2 couple to at least a peripheral device, a controller, and another expander, comprising:
3 storing entries containing routing information used to route a request received by the
4 first expander to one of the interfaces, wherein each interface is allocated a respective set of
5 the routing information entries;
6 determining unused routing information entries allocated to a first one of the
7 interfaces; and
8 remapping the unused routing information entries allocated to the first interface to a
9 second one of the interfaces to enable the second interface to be coupled to additional
10 devices.
- 1 25. The method of claim 24, further comprising:
2 determining unused routing information entries allocated to a third one of the
3 interfaces; and
4 remapping the unused routing information entries allocated to the second interface.
- 1 26. The method of claim 24, wherein the first expander has a port, the port having at least
2 two of the plural interfaces, the method further comprising:
3 mapping the routing information entries such that each of the two interfaces of the
4 port share the same routing information entries.
- 1 27. The method of claim 26, wherein the routing information entries of the at least two
2 interfaces are redundant prior to mapping the routing information entries.
- 1 28. The method of claim 24, wherein storing routing information entries for the interfaces
2 comprises storing routing information entries for serial attached small computer system
3 interface (SAS) phys.

1 29. The method of claim 28, wherein the SAS phys comprise at least one direct routing
2 SAS phy, at least one subtractive routing SAS phy, and at least one table routing SAS phy,
3 wherein routing information entries of the direct routing and subtractive routing SAS
4 phys are unused, and
5 wherein remapping the unused routing information entries comprises remapping the
6 unused routing information entries of the direct routing and subtractive routing SAS phys to
7 the table routing SAS phy.

1 30. The method of claim 24, further comprising storing configuration information,
2 wherein remapping the unused routing information entries is based on the configuration
3 information.

1 31. The method of claim 30, further comprising discovery software populating the routing
2 information entries,
3 wherein remapping is performed without discovery software control.

1 32. The method of claim 24, wherein the first expander is adapted to couple to a first
2 number of devices before the remapping, and the first expander is adapted to couple to a
3 second number of devices after the remapping,
4 the second number being greater than the first number.

1 33. An apparatus comprising:
2 first expanding means having plural interfaces for coupling to at least one of a
3 peripheral device, a controller, and another expanding means,
4 means for storing entries containing routing information used to route a request
5 received by the first expanding means to one of the interfaces, wherein each interface is
6 allocated a respective set of routing information entries; and
7 mapping means for remapping unused routing information entries allocated to a first
8 one of the interfaces to a second one of the interfaces.

1 34. The system of claim 33, further comprising
2 means for determining unused routing information entries allocated to a first one of
3 the interfaces.

1 35. The system of claim 34, further comprising:
2 means for determining unused routing information entries allocated to a third one of
3 the interfaces; and
4 means for remapping the unused routing information entries allocated to the second
5 interface.

1 36. The system of claim 33, wherein the interfaces comprise serial attached small
2 computer system interface (SAS) phys.

1 37. An article comprising at least one storage medium containing instructions executable
2 by an expander, the expander having plural interfaces to couple to devices, the expander
3 storing entries containing routing information used to route a request received by the
4 expander to one of the interfaces, wherein each interface is allocated a respective set of the
5 routing information entries, the instructions when executed causing the expander to:
6 determine unused routing information entries allocated to a first one of the interfaces;
7 and
8 remap the unused routing information entries allocated to the first interface to a
9 second one of the interfaces to enable the second interface to be coupled to additional
10 devices.

1 38. The article of claim 37, wherein remapping the unused routing information entries
2 comprises remapping unused routing information entries allocated to a first serial attached
3 small computer system interface (SAS) phy to a second SAS phy.